

Overview of the ADOT Quiet Pavement Program

TRB Summer Conference 2005
Seattle Washington



Today's Objective

- Introduce ADOT's Quiet Pavement Pilot Program for site 2 receivers
- Outline the data collection procedures
- Display reduction results

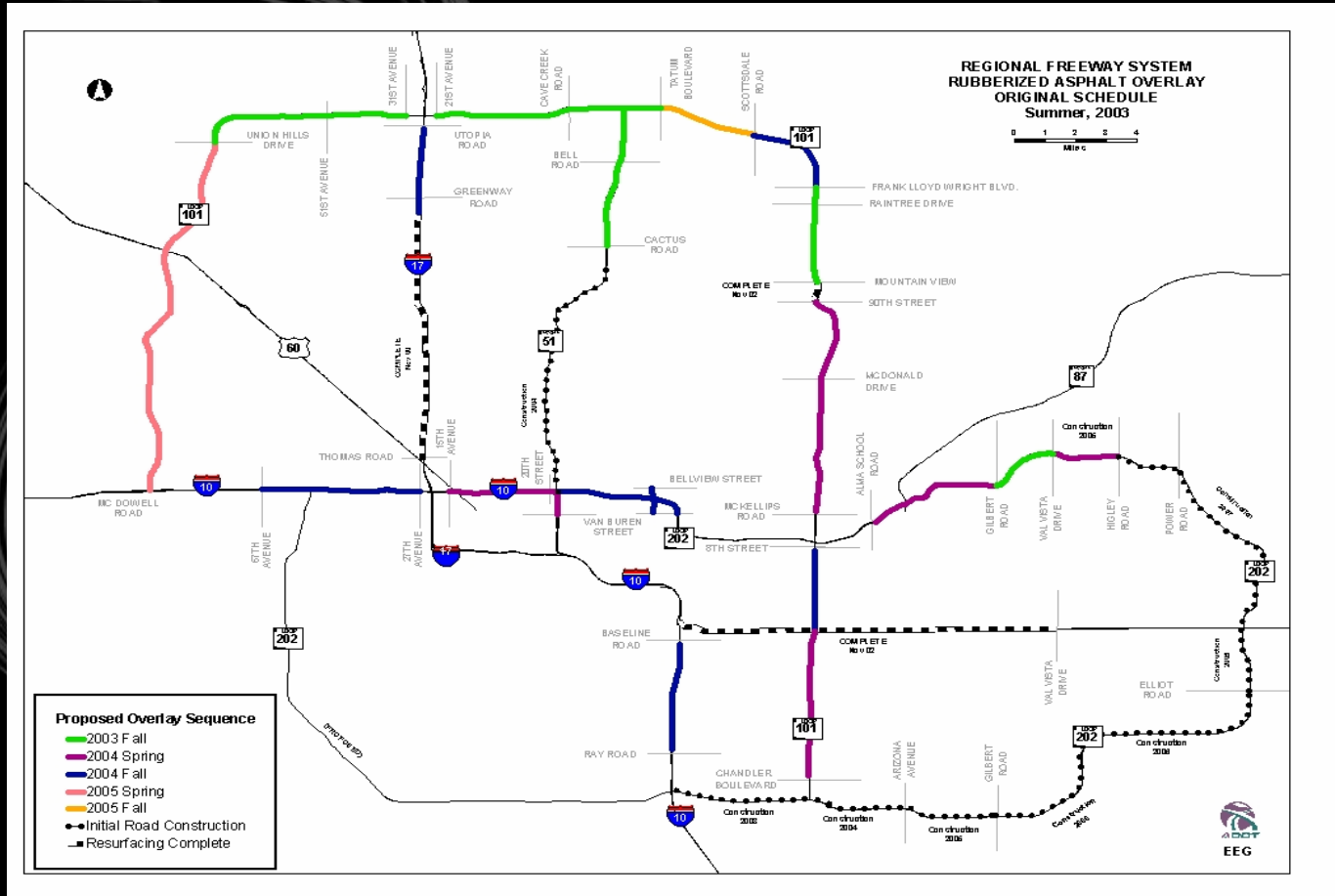
Project Objectives

- Ascertain effectiveness of ARFC as noise mitigation strategy over time
- Develop methodology for project
- Establish protocol for data collection
- Select sites along 18 segments
- Conduct pre- and post-overlay monitoring
- Determine reduction in sound level
- Compile findings in report (in progress)

Project Area

- Throughout the Phoenix Metropolitan area within Maricopa County
- Covers approximately 115 miles of freeway
- Spans across several cities (Phoenix, Scottsdale, Glendale, Mesa, Tempe, Chandler)

Regional Freeway System



Methodology

- “Can rubberized asphalt provide a 4dB reduction in neighborhoods?”

If so...

- “Can this reduction be sustained over a period of time?”

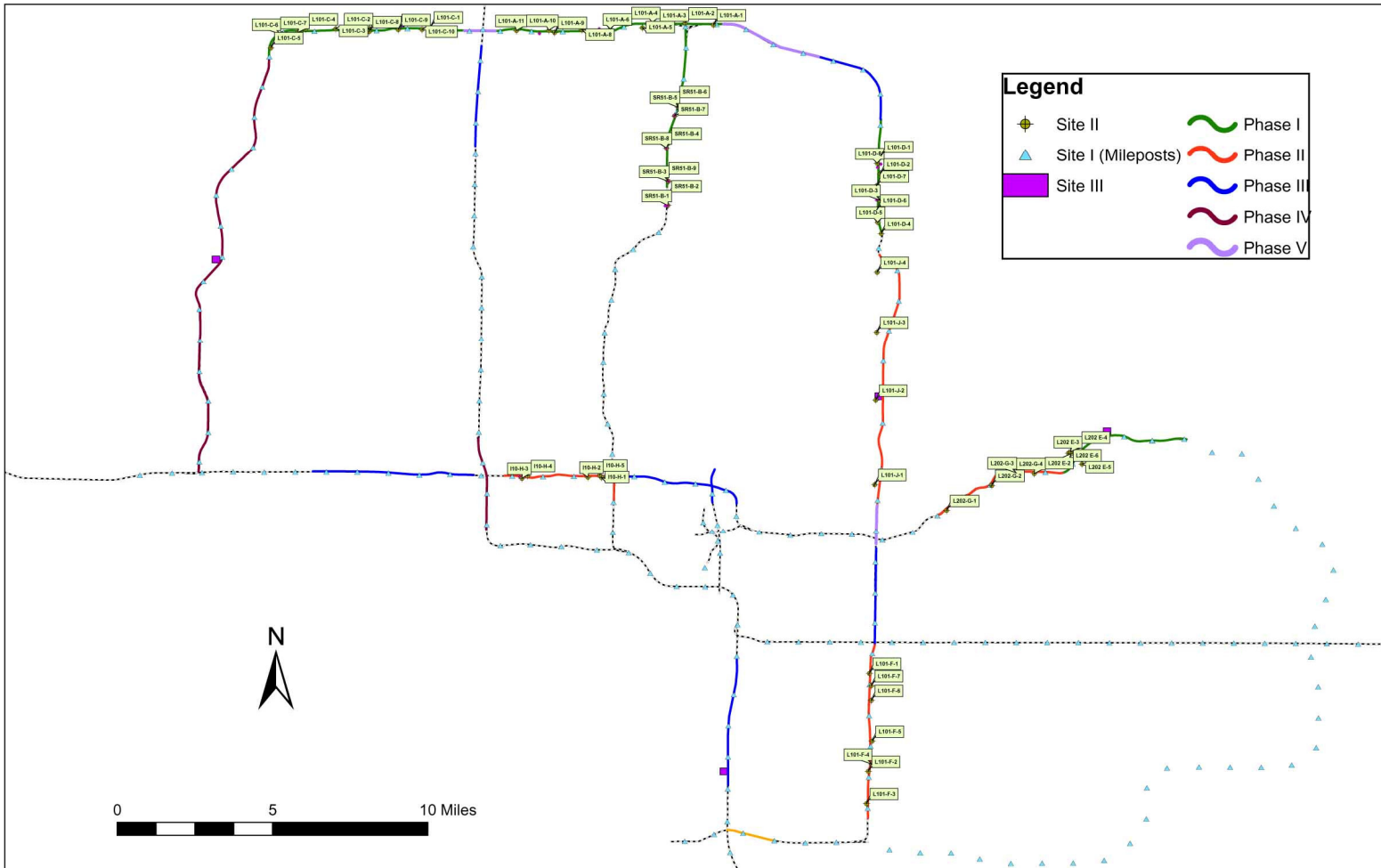
And if so...

- For how long?

Site Selection

- Representative of residential land uses
- Availability of repeat monitoring
- Varying conditions:
 - With and without intervening sound walls
 - Elevated and depressed segments
 - Public facilities (parks, recreation areas)
- When possible residential property was selected

Site 2 Receiver Locations



Monitoring

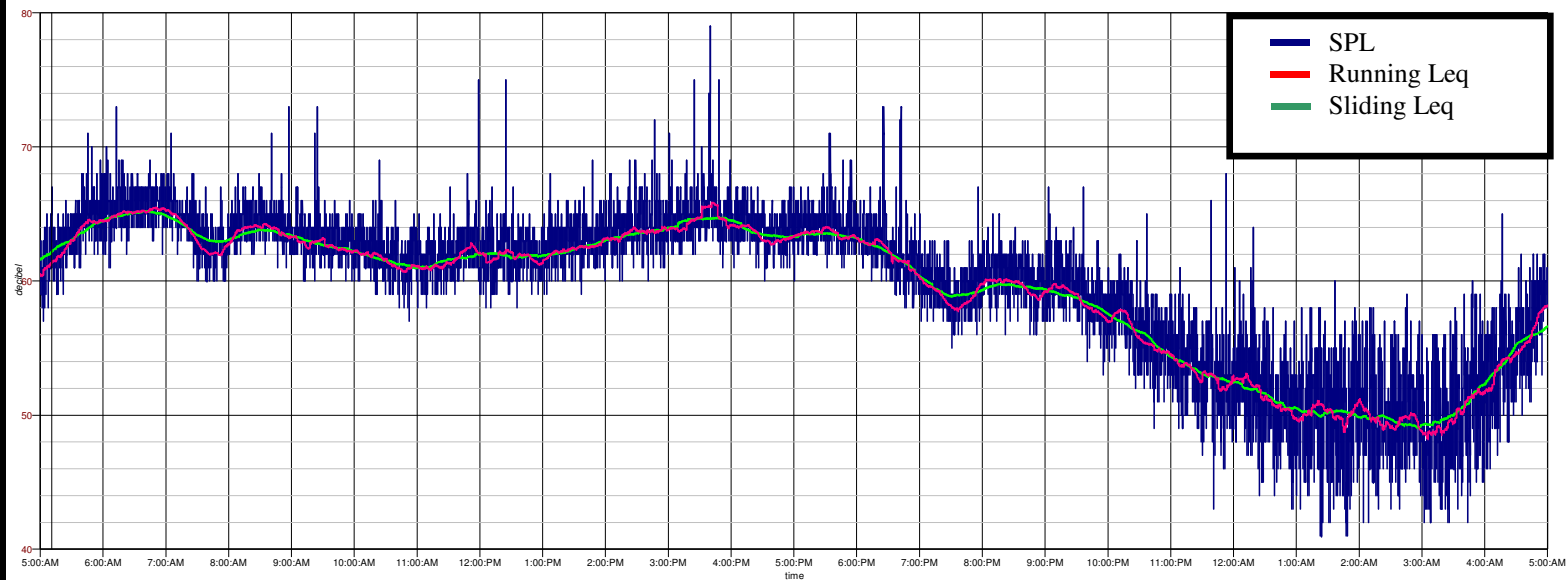
- 24-hour readings (1 per segment)
- Used loudest hour(s)
- 3 consecutive 20-minute readings at each site
- Weather conditions monitored
- Traffic video for counts and speed

24 Hour Reading in DNA Software

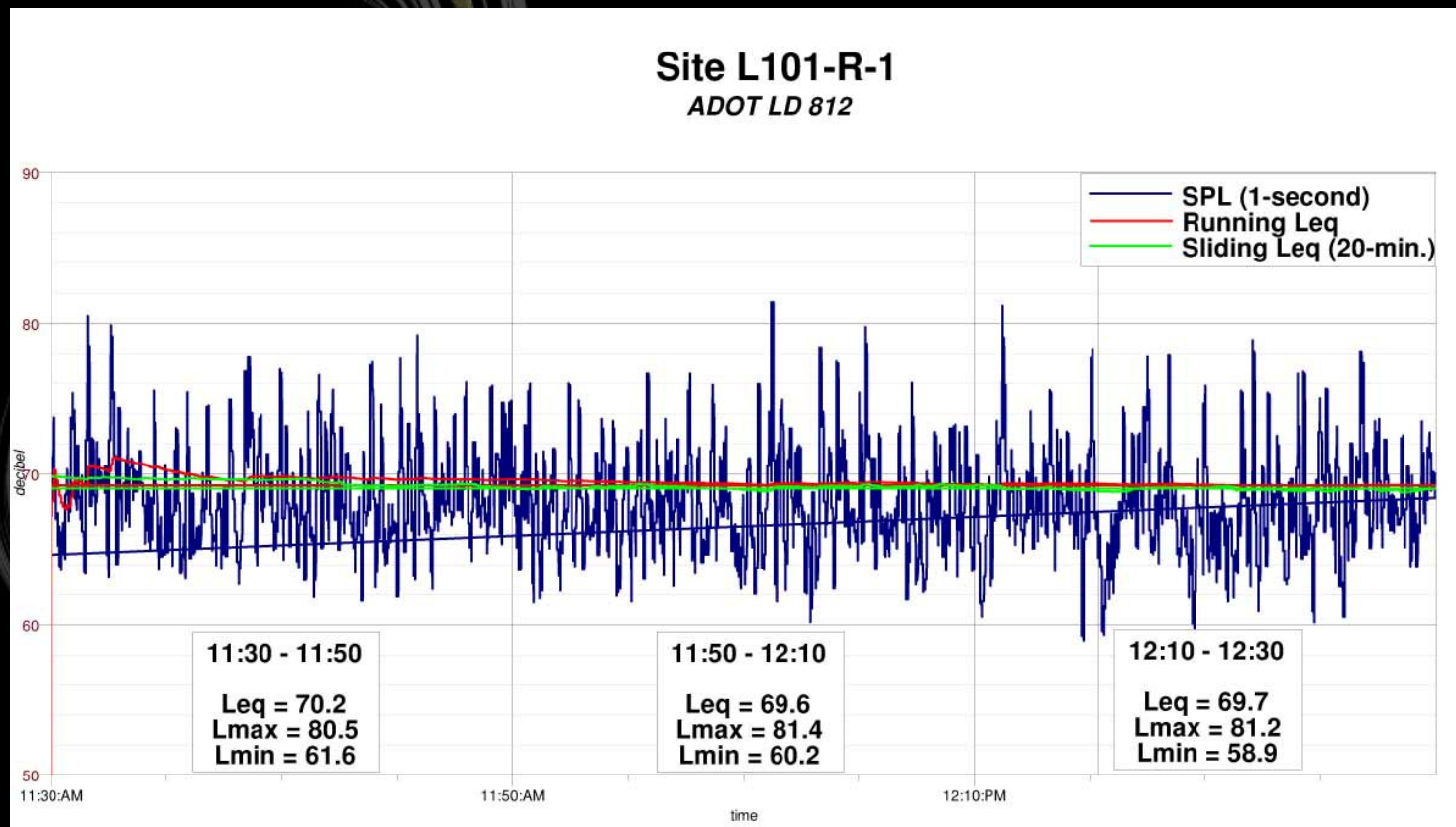
ARFC Overlay Pilot Program

24-Hour Noise Monitoring
September 23, 2003 to September 24, 2003

L101 Pima Freeway - At Cholla Street



1 Hour Reading in DNA Software



Traffic Counts

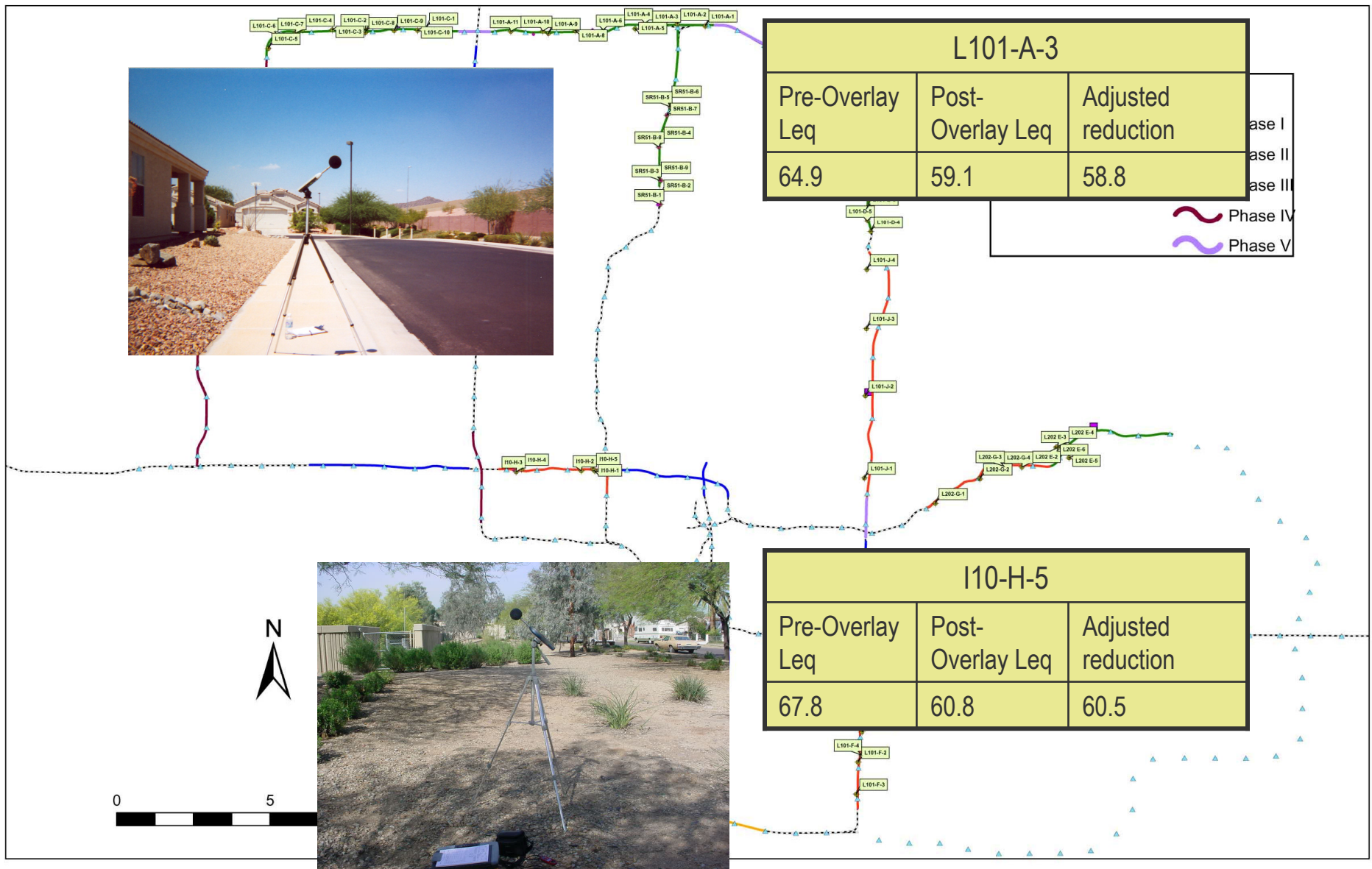
Traffic Counts for L101-A-2-Post

Westbound Traffic

<i>Time</i>	<i>Cars</i>	<i>Motorcycles</i>	<i>2-Axel</i>	<i>3-Axel</i>
0-20 min.	685	0	36	25
20-40 min.	699	2	46	17
40-60 min.	738	2	40	21

Eastbound Traffic

<i>Time</i>	<i>Cars</i>			<i>Motorcycles</i>			<i>2-Axel</i>			<i>3-Axel</i>		
	<i>L101</i>	<i>Off-Ramp</i>	<i>TTL</i>	<i>L101</i>	<i>Off-Ramp</i>	<i>TTL</i>	<i>L101</i>	<i>Off-Ramp</i>	<i>TTL</i>	<i>L101</i>	<i>Off-Ramp</i>	<i>TTL</i>
0-20 min.	1053	338	1391	3	0	3	51	15	66	19	4	23
20-40 min.	1071	355	1432	4	0	4	50	16	66	16	4	20
40-60 min.	1033	331	1364	2	0	2	52	15	67	16	4	20



Data Analysis/Reduction

- Vehicle equivalents used to compare pre and post readings

Equivalent Vehicles Based on TNM REMELs**			
	NUMBER OF EQUIVALENT VEHICLES		
Speed km/h (mph)	1 Heavy Truck =	1 medium truck =	1 Automobile =
56 (35)	19.1	7.1	1
64 (40)	15.1	5.8	1
72 (45)	12.9	5.0	1
80 (50)	11.5	4.5	1
88.5 (55)	10.4	4.1	1
97 (60)	9.6	3.7	1
105 (65)	8.9	3.5	1
113 (70)	8.3	3.2	1

** Based on FHWA Traffic Noise Model (TNM) Reference Energy Mean Emission Levels and vehicle definitions in FHWA-PD-96-008, DOT-VNTSC-FHWA-96-2.

Vehicle Equivalents Calculation Sheet

Site Name:	SR101-A-1								
Before Noise Level	Leq (1)	74.6							
After Noise Level	Leq (2)	69.8							
Before		EB		WB		Total		65 mph	
(Measurement 1)	Cars	6652	+		=	6652	*	Equiv	V _E
	MT	241	+		=	241	*	1	= 6652
	HT	166	+		=	166	*	3.5	= 843.5
								8.9	= 1477.4
								Total V _E (1)	= 8973
After		EB		WB		Total		65 mph	
(Measurement 2)	Cars	6944	+		=	6944	*	Equiv	V _E
	MT	227	+		=	241	*	1	= 6944
	HT	253	+		=	166	*	3.5	= 794.5
								8.9	= 2251.7
								Total V _E (2)	= 9990
Correction									
Formulas:									
C=10Log ₁₀ [V _E (1)/V _E (2)]						Leq(2N)=Leq (2) + c			
c = -0.5						Leq (2N) = 69.3			
Comparison									
Before [Leq(1)] =	74.6								
After [Leq (2N)] =	69.3								
Difference =	5.3								
After noise level at SR101-A-1 is 5.3 decibels lower than "Before" Noise Level.									

Findings to Date

- Average reduction exceeds 4dB
- Public reaction is favorable toward rubberized asphalt in the Phoenix area

Reduction to Date (in decibels)	
Phase 1	4.9
Phase 2	5.6
Overall	5.3

Questions and Answers

HDR

